GWL/ Power Group Technology Solutions - Stay Powered for the Future

OPERATING AND INSTALLATION MANUAL

Tank-type water heaters for combined water heating by means of AC/DC current for vertical assembly

GF-BOIL-100L

CAREFULLY READ THIS MANUAL BEFORE INSTALLING THE WATER HEATER!

To ensure proper functioning, the water heater must be connected to a permanent power supply. Installation may only be performed by a person authorized to carry out electric installations.

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Prumyslova 11, CZ-10219 Prague 10, CZECH REPUBLIC (EU)
phone: +420 277 007 500, fax: +420 277 007 529, email: export@i4wifi.cz

INFORMATION FOR CUSTOMERS

LX ACDC/M+K(W) type electrical and combined water heaters utilize alternating (AC) current from the electric grid, e.g. from a 230V socket, and direct (DC) current from photovoltaic panels, which ensure the ecologically clean production of hot water and save significant financial sources for the user by minimizing consumption of gas or electricity from the grid. In addition, due to the separate systems, the water heater first heats using photovoltaic panels, and in the case of cold water, it supplements heating using electricity from the 230V grid.

In addition, the LX ACDC/M+KW model has a shifted tubular heat exchanger for providing heat from another source, or, on the contrary, by using heat from the water heater. Information on connecting this model can be found in Chapter: 12 - Connecting the heat exchanger for LX ACDC/M+KW 200

GF-BOIL-100L water heater is meant to be used with various kinds of FV panels from various manufacturers. They must however embody the following qualities: Voltage: 30V ±10% and Current: 8.3A ±5% / 1 FV panel!

Photovoltaic panels can be installed at any place with maximum sunshine and south oriented, but must not be freely accessible due to the fact that they produce electric energy and there is a risk of electrical injury. Therefore always let an authorized service company deal with the assembly. For DC supply, water heaters are designed for:

4 pcs panels with an output of 250W/1 panel - 1,0kW/120V (A)
6 pcs panels with an output of 250W/1 panel - 1,5kW/180V (B)
8 pcs of panel with an output of 250W/1 panel - 2.0 kW/240V (C)

GF-BOIL-100L is equipped with a universal DC heating element, which enable all 3 variants of output: A,B a C, with the help of a mechanical reconnection of the inlet conductor, directly on the heating element. During production, the heating element is always connected to 2kW (8 pcs of panel). If a lower number of panels is used (4 pcs =1.0kW and 6 pcs=1.5kW) 1. This reconnection may be performed solely by a professionally trained individual!

The above stated outputs must not be exceeded for the respective types!

It is possible to use panels with a lower output, however the output of the heating element running on DC current will decline proportionately.

Before each intervention into the inner parts of the construction of water heater, it is necessary to always disconnect from both sources of AC and DC current!

Accumulation water heaters with combined heating using AC and DC current may be used to heat water by AC current only from the grid, or by DC current from photovoltaic panels or simultaneously, in various combinations of temperatures set by means of two separate thermostats. LX water heaters are even meant for pre-heating and supplementary heating of water. This type of use is suitable as a supplementary system for already existing system of water heating for users using a system in which the heater is placed before or after the system. All water heaters of the M+K(W) line are equipped with a tubular heat exchanger, which allows them to connect to an external heat source (furnace, fireplace, natural gas heater, and the like). For M+KW models that are made only in the 200L version, the tubular heat exchanger is located in the upper part of the heater. That type of solution enables the top half to be heated by gas and the bottom half by photovoltaic panels and once the temperatures are in balance, then all 200L of the water heater only by photovoltaic panels. The M+KW model can also be utilised as a source of power for floor heating in low- energy and passive homes.

Picture 1:

GF-BOIL-100L water heaters are mainly intended to utilize both electric energy sources. A stable source of AC current from the grid permanently heats water to a temperature that is set using the T1 thermostat. In practice, the recommended temperature is 45^0 C. Upon reaching the pre-set temperature, the T1 thermostat switches off the inlet of AC current. DC current from photovoltaic panels keeps heating the water to the preset temperature on thermostat T2.
If the water temperature drops (water withdrawal) to below 45°C with the sun shining, the water is very quickly and effectively heated by both sources of current. In the winter period (from 1.Nov.-1.Mar.), we recommend setting thermostat T1 to a higher temperature due to weaker sunshine.

WARNING: The thermometer on the water heater measures the temperature of the metal water container, and therefore there may be deviation from the actual water temperature.

OPERATION & ASSEMBLY REGULATIONS FOR WATER HEATERS:

Type: electric

Type: combined with a 1 m^2 heat exchanger

Type	LX ACDC/M+K GF-BOIL-100L	LX ACDC/M+K 125 ABC	LX ACDC/M+K 160 ABC	LX ACDC/M+K 200 ABC	LX ACDC/M + KW 200 ABC
Electrical current for heating	AC+DC	AC+DC	AC+DC	AC+DC	AC+DC
Heat losses [kWh/24h]	0,88	1,09	1,39	1,4	1,4
Capacity [l]	95	120	147	195	195
Weight [kg]	58	64	72	88	88
Height x diameter [mm]	881x524	1046 x 524	1235x524	1287 x 584	1287 x 584
Power input of AC coil [kWh]	2	2	2	2	2
Exchanger heat transfer surface [m^2]	1	1	1	1	1
Rated thermal output at heating water temperature of 80°C and flow 720l/h l/h [kW]	24	24	24	24	24*

Table 1

*) This value specifies the maximum output, which the exchanger is able to transfer to the water in the heater, while connecting the exchanger to an external source of heat. For the LX ACDC/M+KW 200 ABC model for when connecting the exchanger to a system of floor heating which utilizes heat from the water heater. The output therefore depends on the actual amount of heat accumulated in the heater.

FUNCTION OF THE HEATER

Water heating by electric energy

Once connected to the electric grid (230V AC), the heater is ready to heat water. **Even in the case of water heating using only DC current, it is necessary to connect the heater to the electrical grid (230V).** Electricity consumption from the network is minimal when the T1 thermostat is off, and represents a value of 0.0039 kW. To heat water using DC current from photovoltaic panels, the desired temperature has to be set on thermostat T2. When the sun is shining, the panels produce current, which heats the heating spiral of the water heater. The switching on and off of spiral heating is controlled by thermostats.

The thermostats can be set as needed within the range of 5°C to 74°C. We recommend setting the water temperature while heating with DC to a maximum temperature of 70°C. This temperature ensures the optimal utilisation of the electric source from photovoltaic panels.

After reaching the set temperature, the thermostat switches off the electricity supply and discontinues water heating.

The **orange** control light indicates that the device is in operation. If it is on, the device is running. If it goes off, the device is out of service.

The **green** control light signalizes the input of the direct current from the photovoltaic panels. If it is on, the panels are producing electrical energy.

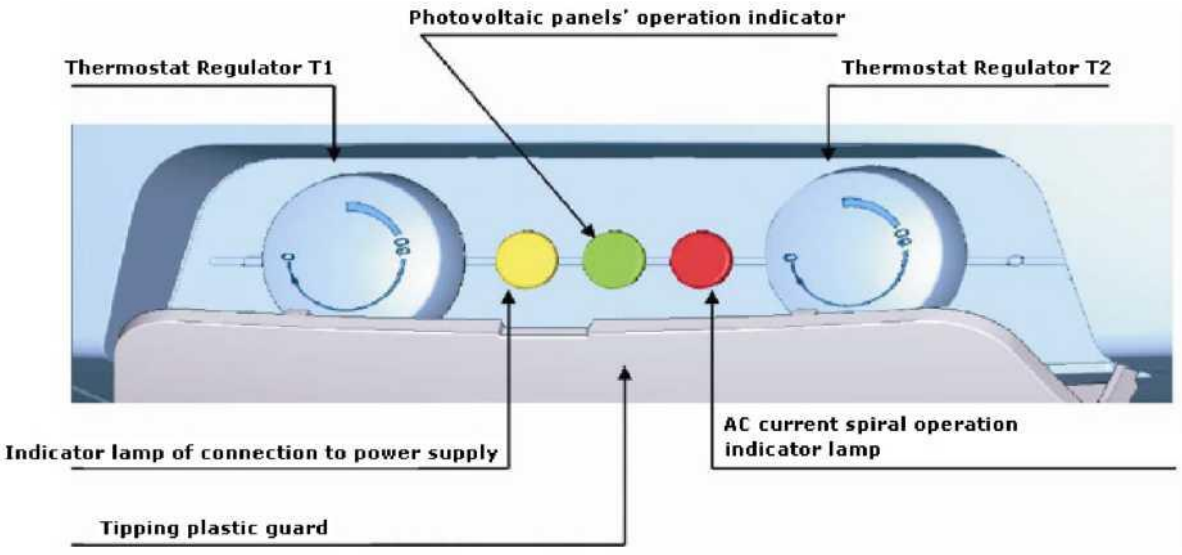
Heating water by means of AC current from network is indicated by a **red** control light. If it goes off, heating of water by AC current is off.

Caution! Water heated to 70°C is very warm to the touch. To use it, it has to be mixed with cold water. The manufacturer recommends mounting of a mixing valve to the hot water outlet and setting a maximum temperature on thermostat T2. On sunny days the temperature in the heater can achieve up to 90°C, which is a temperature that, in case of scalding, may cause health complications. Output temperature suitable for general use shall be set on the mixing valve.

The closing valves of the tubular heat exchanger must be opened, which ensures heating water flow from the hot water heating system. Along with a closing valve at the inlet to the heat exchanger, it is recommended to install an air removal valve, in order to bleed the heat exchanger as needed, in particular before the beginning of the heating season. The time it takes to heat up using the heat exchanger depends on the temperature and flow of water in the hot water heating system. Combined heaters are made with a universal design, i.e. the outlets of the exchanger exit at the rear of the heater, for cases when it is necessary to either connect from the right or left.

SERVICING

CONTROL PANEL:


Photovoltaic panels' operation indicator
Thermostat Regulator T1
Thermostat Regulator T2
Indicator lamp of connection to power supply
AC current spiral operation indicator lamp
Tipping plastic guard

The heater tank is made of a steel plate and tested at 0.9 MPa of overpressure. The inside of the tank is enamelled. A flange is welded onto the bottom of the tank with a flange lid screwed to it. A sealing ring is inserted between the flange lid and the flange to ensure perfect tightness. There are wells for the placing of heating, regulation and safety elements for water heaters in the flange lid (heating element, thermostat sensor and thermal fuse). An anode rod is mounted onto the M8 nut.

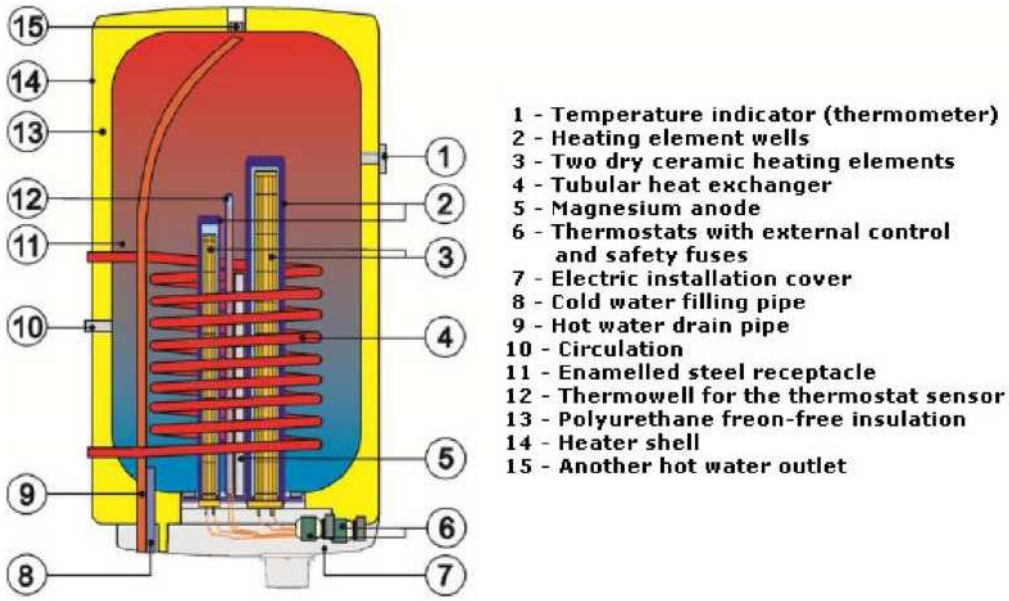
In combined versions, a heat exchanger is welded onto the pressure tank.

The anode rod is used as a secondary protection for the heater tank. Through its reaction with water, it creates an environment that prolongs the lifetime of the tank. The design of the anode and the material used comply with the standard EN 12438.

A thermometer, that transmits information on the temperature of water in the accumulation heater, is installed in the top part of the heater.
The accumulator is insulated by means of polyurethane foam that ensures minimal heat losses. Electric wiring is placed in the bottom part of the heater, under an easily removable guard. Temperature of water can be set by thermostats within the range between 5°C and 74°C according to the scale marked thermostat regulators. Cold water inflow is indicated with blue, hot service water (the "HSW" hereinafter) outflow is indicated in red. All external steel parts are protected against corrosion with a powder baking paint; connecting pieces are metal plated.

TECHNICAL DESCRIPTION

DIAGRAM OF GF-BOIL-100L:



Picture 2

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Prumyslova 11, CZ-10219 Prague 10, CZECH REPUBLIC (EU)
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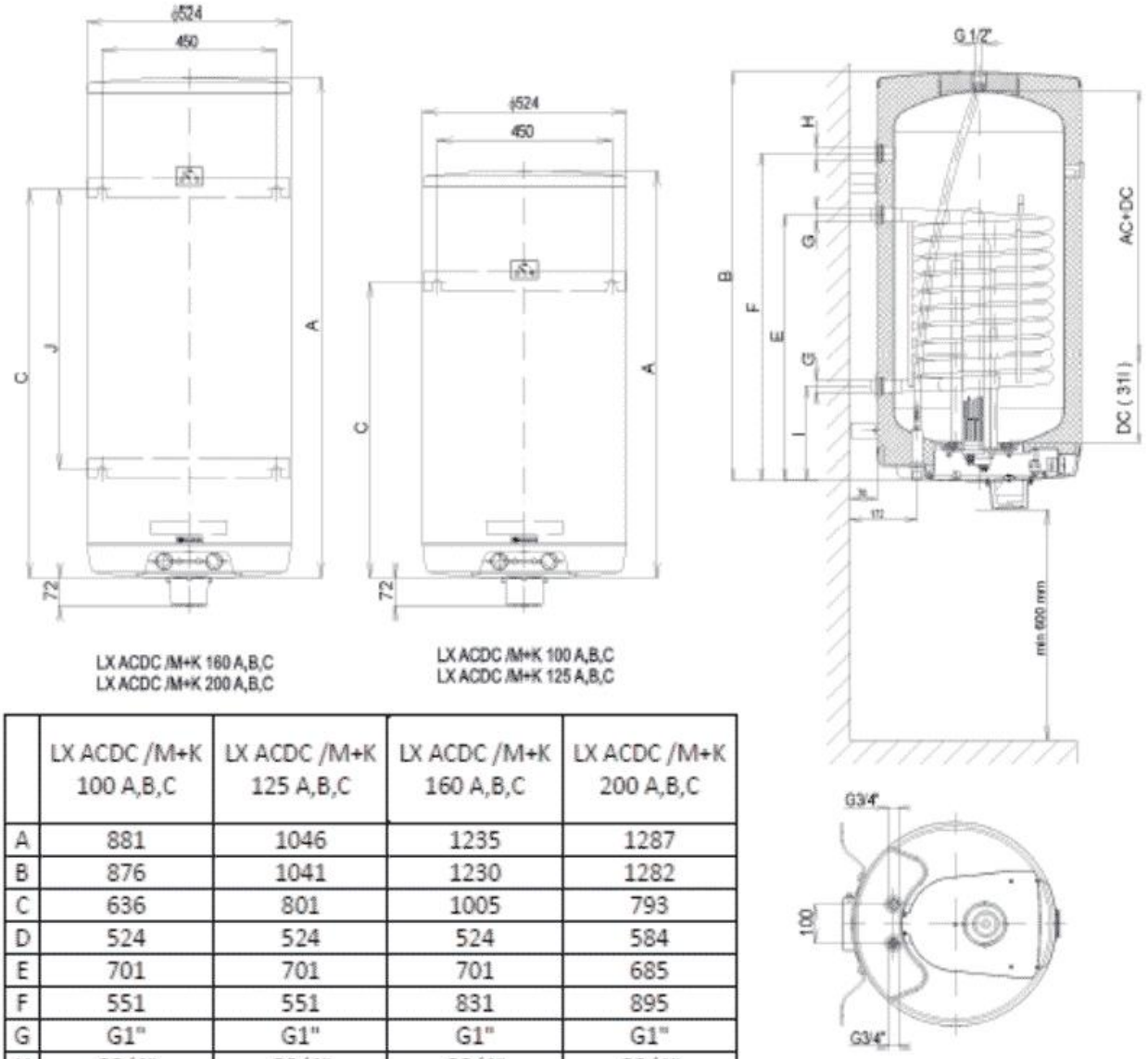
DIMENSIONS OF: GF-BOIL-100L; LX ACDC/M+K 125 A,B,C; LX ACDC/M+K 160 A,B,C; LX ACDC/M+K 200 A,B,C:



	LX ACDC /M+K 100 A,B,C	LX ACDC /M+K 125 A,B,C	LX ACDC /M+K 160 A,B,C	LX ACDC /M+K 200 A,B,C
A	881	1046	1235	1287
B	876	1041	1230	1282
C	636	801	1005	793
D	524	524	524	584
E	701	701	701	685
F	551	551	831	895
G	G1"	G1"	G1"	G1"
H	G3/4"	G3/4"	G3/4"	G3/4"
I	261	261	261	245
J	-	-	815	600

Picture 5:

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OPERATING ACTIVITY

The heater operates on a pressure principle which means that there is constant water pressure from the water supply conduit in the tank.
If the combination faucet hot water valve is opened, the water from the water supply conduit pressed out by cold water pressure flows out of the heater. Hot water flows out through the top part, and water flowing in remains in the bottom part of the heater.

ACCESSORIES

The product comes with a safety valve and a thermometer. Hinges and bolts are mounted onto the heater. It is in your own interest to check the completeness of the accessories.

With regard to various types of carrying masonry and broad assortment of special anchorage material available at the market, the manufacturer does not provide heaters with this material. The anchorage system has to be selected individually, depending on the conditions. We recommend an authorised company perform mounting on the wall and anchorage, or discuss the anchorage with a professional.

WALL MOUNTING

Prior to mounting, check the loading capacity of the wall, If needed, reinforce it. Choose a suitable anchorage material to suspend the heater, depending on the type of the wall. The water heater shall only be mounted in vertical position so that the lower edge of the heater is placed at least 60 cm above the floor.

PLUMBING FIXTURE

Connection of heaters to plumbing fixtures is illustrated on Figure 6. For potential disconnection of the heater, the service water inlets and outlets must be provided with screw coupling Js 3/4". For operation, the heater must be equipped with a safety valve. The safety valve is mounted on the cold water inlet identified with a blue ring.

Each hot service water pressure heater must have a safety valve with a membrane spring.

The safety valve must be easily accessible, as close to the heater as possible. The inlet pipes must have at least the same clearance as the safety valve. The safety valve is placed high enough to secure dripping water drain by gravity. Safety valves with fixed pressure settings from the manufacturer are used for the assembly. The start-up pressure of the safety valve must correspond to the max. allowed pressure of the water heater. If the water main pressure exceeds such value, a reduction valve must be added to the system, whose working pressure is to be set to 80% of the start-up pressure of the safety valve. Necessary pressure can be found in table 2. No stop valves can be put between the heater and the safety valve. During assembly, follow the guide provided by the safety equipment manufacturer. It is necessary to check the safety valve each time before putting it into operation. It is checked by manual moving of the membrane from the seat, turning the make-and-break device button always in the direction of the arrow. After being turned, the button must click back into a notch. Proper function of the make-and-break device results in water draining through the safety valve outlet pipe. In common operation, such a check needs to be implemented at least once a month, and after each heater shutdown for more than 5 days. Water may be dripping off the drain pipe of the safety valve; the pipe must be open into the air, pointed down; environment temperatures must not drop below zero.

When draining the heater, use the recommended drain valve. First, close the water supply into the heater. For proper safety valve operation, a backflow valve must be mounted on the inlet pipes, preventing spontaneous heater draining and hot water penetrating back into the water main.

Hot service water is withdrawn by means of a combination faucet from the outlet pipe marked with red color. If HSW distribution is longer, it should be insulated to minimize heat losses. All outlets must be equipped with combination faucets that allow setting the desired temperature of water.

Spouštěcí tlak pojistného ventilu [MPa]	Přípustný provozní přetlak ohřívače vody [MPa]	Maximální tlak v potrubí studené vody [MPa]
0,6	0,6	do 0,48
0,7	0,7	do 0,56
1	1	do 0,8

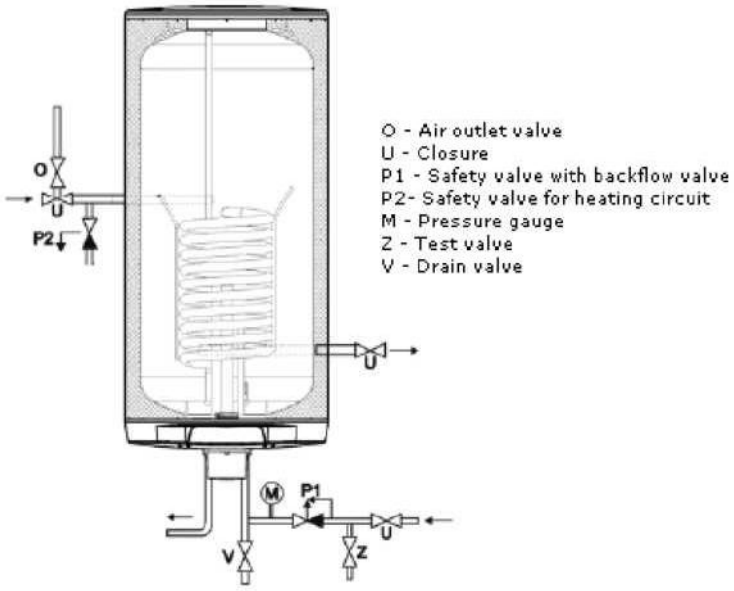
Table 2

Water installation must follow and meet the requirements and regulations relevant in the country of use.

NOTICE: If the safety valve isn't equipped with a drain opening, we recommend adding a drain valve in a suitable location before the safety valve. If the pressure in the water piping exceeds 0.6 MPa, we recommend installation of a pressure control valve, as well. The appliance is not designed to be serviced by people (including children) with limited physical, sensual or mental abilities, or those having lack of experience and knowledge, unless a person responsible for their safety provides supervision or familiarize them with the way of using the appliance.

Safety valve:
TE-2852 DN20- direct safety valve with inner connecting threads inside the body

Technical data:
Maximum pressure 0,6MPa
Safety overpressure 0,63 + 0,03MPa



Picture 6:

CONNECTION OF A COMBINED HEATER

It is recommended to install stop valves on the heating water inlet and outlet (for possible dismantling of the heater).
The valves have to be as close to the heater as possible to avoid higher thermal losses.
In combined versions, the stop valve on the inlet to the exchanger has to be closed at the inlet to the tubular heat exchanger while heating using el. energy, which prevents heating water in the hot water heating system.
In the case that the heat exchanger isn't utilised, it is necessary to leave the plastic stoppers on the outlets of the heater (from manufacturer), so that air doesn't circulate in the heat exchanger's spaces.

ELECTRIC INSTALLATION

Connection, repairs, and wiring inspections may only be implemented by a person authorised to such activity. Electric installation must comply with valid electro-technical standards. Connection to electric network shall be executed only after the plumbing has been installed. Elements for disconnection from the electric grid must be built into the fixed electric grid distribution that contains separation of contacts in all positions.

Electric installation must follow and meet the requirements and regulations relevant in the country of use. Connecting the GF-BOIL-100L heater facilitates the connection of two inlets and one outlet. The outlet is meant for direct current.

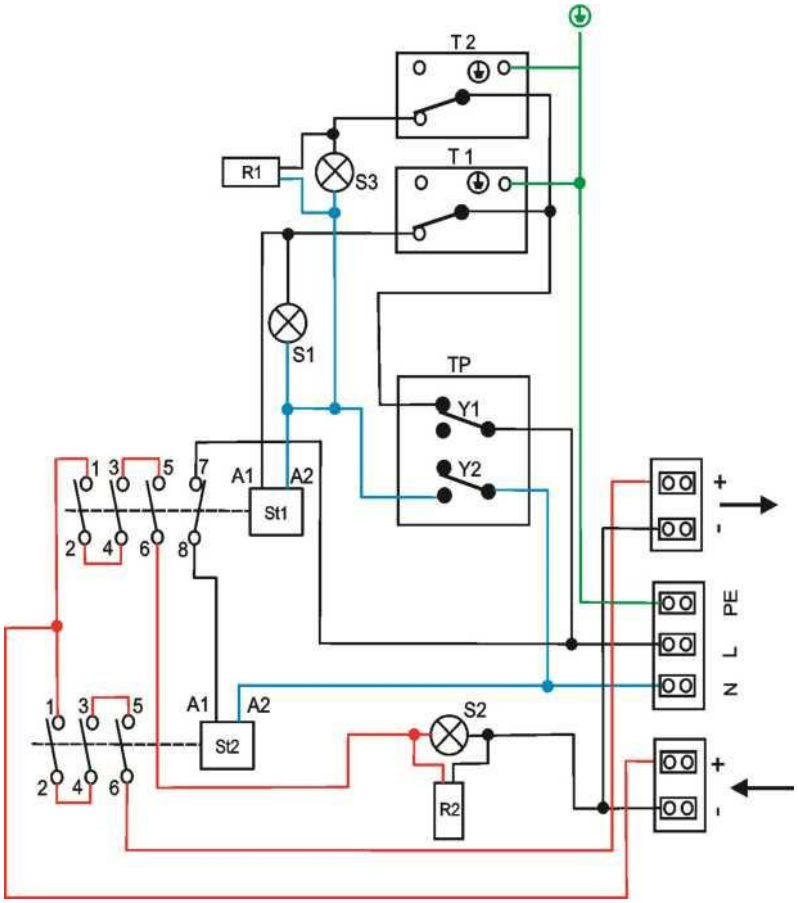
To control photovoltaic supply, the system has to be connected to the power grid from the nearest continuous supply (socket), into 230V clamps: L, N and PE.

The following safety elements are recommended for installation of photovoltaic system:

1) **SPD type 1 lightning diverter (e.g. SLATEK FLP-500 PH V/2, FLP-500 PH V/25)**
2) **Direct current circuit breaker (e.g. Moeller X pole PL7-C16/2-DC). This circuit breaker must be designed according to the characteristics of the panels. The maximum value of protection is stated by the manufacturer in the parameters of the photovoltaic panels.**

Before any manipulation with the connections of the water heater, make sure that all inputs of AC and DC current are disconnected!

WIRING DIAGRAM



T1 Thermostat for DC heating
T2 Thermostat for AC heating
TP Heat fuse
St1 Contactor for switching on FV heating
R1 AC Heating element
S1 - Indicator lamp of connection to power grid
S2 - Indicator of DC spiral activity
S3 - Indicator of AC spiral activity
St2 Contactor for switching between R2 DC Heating element (photovoltaic)

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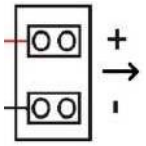
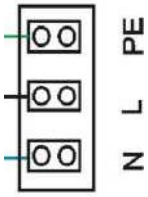
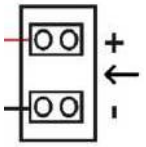


For clamps + and - with arrow facing out it is possible to connect a DC/AC converter, or another appliance with direct DC current. (Battery, another LX ACDC heater) These clamps don't need to be connected.



Clamps N, L and PE serve for the connection of alternating AC current. Without connecting these clamps, the heater is not functional!



Clamps + and - with arrow facing in are meant for connection to PV panels.

After connecting the heater to the water distribution system, electrical power system and source of current from photovoltaic panels, and after testing the safety valve (following the instructions attached to the valve) the heater can be put into operation.

Procedure:

a) Check the plumbing and electrical installation, including the connection to hot-water heating system. Check proper placement of operating and safety thermostat sensors. The sensors in the well must be inserted all the way in; first the operating and then the safety thermostat.
b) Open the hot water valve on the combination faucet.
c) Open the cold water inlet valve to the heater.
d) As soon as the water starts running through the hot water valve, the heater is filled and the valve closes.
e) In case of a leakage (flange lid), we recommend fastening the flange lid bolts.
f) Connect the water tank to alternate current electric network
g) Connect the water tank to direct current source from photovoltaic panels.
h) Prior to putting the heater into operation, screw the electric installation guard to the heater which closes the access to the electric compartment of the heater. During water heating, water occasionally drips through the safety valve which is a normal phenomenon caused by growing volume of water.
i) Rinse the heater out before you start using it.

FIRE-FIGHTING REGULATIONS FOR INSTALLATION AND USE OF HEATER

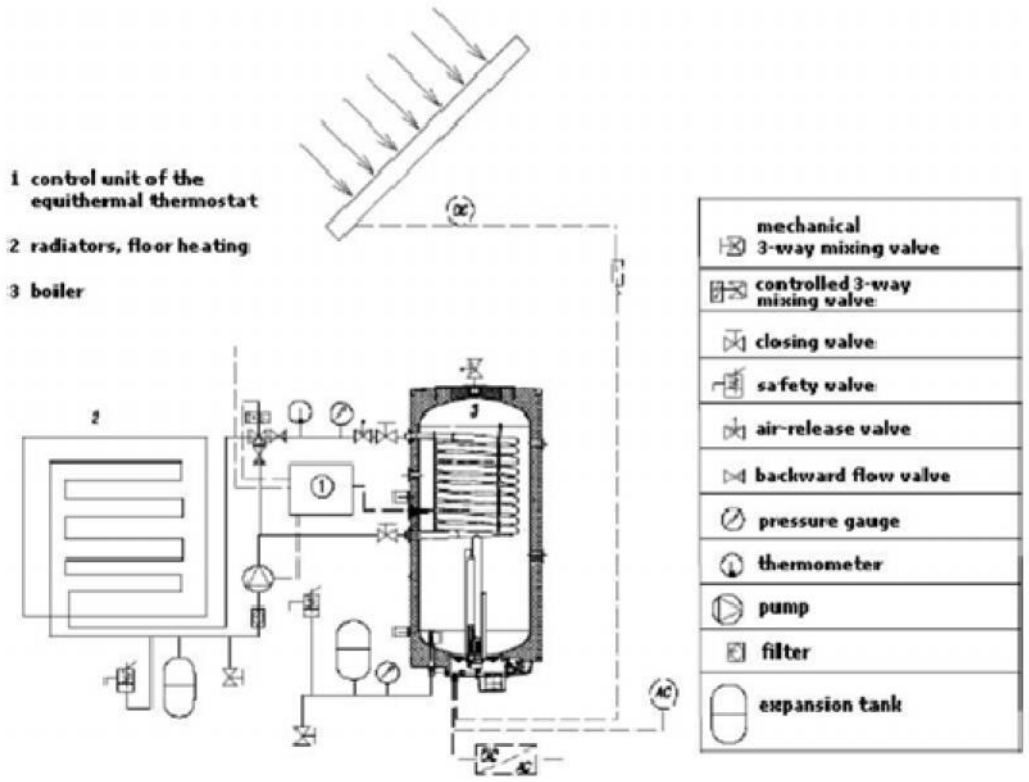
Fire-fighting regulations for heater installation are defined in relevant standards.

The heater must not be connected to power supply and direct current source of photovoltaic panels if work involving flammable liquids (petrol, spot remover) or gases, etc., is performed nearby.

CONNECTION OF HEAT EXCHANGER U LX ACDC/M+KW 200 A,B,C

Figures 8 and 9 show the scheme for connecting the LX ACDC/M+KW 200 for floor heating systems for low-energy and passive homes.

Picture 8:



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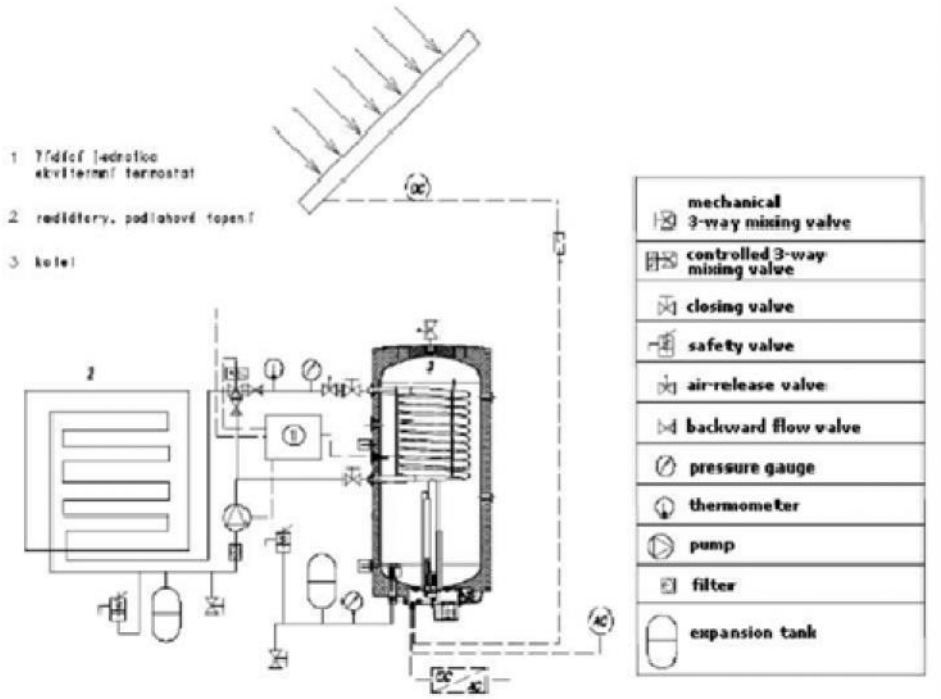
Picture 9:



IMPORTANT NOTICES

Both the electric and water installation must follow and meet requirements and regulations relevant in the county of use!

DISPOSAL OF PACKAGING MATERIAL AND NON-FUNCTIONING PRODUCT:

A service fee for providing return and recovery of packaging material has been paid for the packaging in which the water heater was delivered. The service fee was paid in accordance with Act no. 477/2001 Coll., as subsequently amended, at EKO-KOM a.s. The client number of the company is F06020274. Take the water heater packages to a waste disposal place determined by the municipality. When the operation terminates, disassemble and transport the discarded and unserviceable heater to a waste recycling centre (collecting yard), or contact the manufacturer.

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